

# **National Agricultural Research, Extension, Education and Economics Advisory Board**

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## **Report on Sustainability in Support of Food Security** October 2010

### **EXECUTIVE SUMMARY**

In order to assess the challenges associated with sustainability in support of food security, the National Agricultural Research, Extension, Education and Economics Advisory Board (NAREEEAB) organized a program of speakers from the public and private sector to assess potential research and education needs. The speakers provided valuable insights into the current status of sustainability in the food system, including potential limits to agricultural production, consumer-driven sustainability models and the needs for sustainable food enterprises for low income populations. The different views of food security were presented and discussed, with emphasis on the role and importance of United States Department of Agriculture (USDA) research in dealing with global food security challenges.

Based on the presentations and discussions, the Board developed the following recommendations:

- A definition of sustainability in the food system should focus on delivery of safe and high quality food to consumers while reducing impact on energy use, water resources and the environment, increasing efficiency in utilization of material resources, improved conservation of natural resources, and enhanced sensitivity to the views of the consumer and community.
- Future efforts on food security must recognize the differences between global and domestic challenges.

- Research on development of accurate and consistent input data for sustainability models should be given priority. Sustainability models for the food system should include the ability to quantify impacts on land use, soil loss, water use, energy use, and climate change.
- The focus of food production research should be on increased quantities, but with emphasis on improved efficiency in the use of all natural resources.
- High priority should be given to research on reducing losses and wastes throughout the food system.
- USDA collaboration with the public and private sectors should be expanded to encourage sustainable food enterprises for low income families.
- Funding for institutions involved in the education of a new generation of agricultural scientists must be a high priority.

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### **Background**

During the March, 2010 meeting, the National Agricultural Research, Extension, Education, and Economics (NAREEE) Advisory Board explored the interface between sustainability of the food system and food security. Several outside speakers were invited to address the Board in an effort to provide members with sufficient understanding of the issues associated with these broad topics to develop appropriate and meaningful recommendations to the Secretary of Agriculture and members of Congress.

In the global context, sustainable food systems include all aspects of agricultural production, handling, processing, distribution and delivery needed to meet world-wide demands for food, while accounting for resources required in responding to these demands. At the community level, sustainability requires the establishment of enterprises that meet the food delivery demands in a manner that matches the financial resources of the community.

Food security may be defined as having access to enough food for an active, healthy life at all times. This definition implies the availability of nutritionally adequate and safe foods and the assured ability to acquire foods in socially acceptable ways. Although the definition of food security may be global, responding to domestic food security challenges is significantly different than global food security challenges.

The overall goal of the March session was to identify research, education and outreach needs at the interface between food security and sustainability. As a part of this goal, the

potential conflicts associated with meeting the challenges of global and domestic food security, while responding to current sustainability trends, were explored. Specifically, the NAREEE Board was committed to develop recommendations on research, education and outreach to be pursued by appropriate agencies within the United States Department of Agriculture (USDA).

### **Definitions of sustainability**

Sustainability has evolved with several meanings and interpretations. Many of the different interpretations are associated with the intended applications. Current trends are based on a 1987 UN definition: “sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs”. This general definition has influenced many of the current trends and applications for the food system. The sustainable food systems initiative described by Daniel M. Dooley, Senior Vice President for External Relations, University of California - Division of Agriculture and Natural Resources, is inclusive and includes commercial agriculture, organic agriculture, integrated pest management, new biofuel crops, conservation tillage, urban agriculture, small farms and sustainable agriculture. Yet, these components do not include the requirements to ensure sustainability in the movement of foods from the farm to the consumer. Certainly, many of the ‘market-driven’ initiatives propose the use of metrics that require inputs from all sectors of the food system. An inclusive definition of sustainability applied to the food system might be: “A system for delivery of safe and high quality food to consumers while reducing impact on energy and water resources and climate, increasing efficiency in utilization of material resources, improved conservation of natural resources, and enhanced sensitivity to the views of the consumer and community”. This definition is consistent with the definition presented in the recent National Research Council Report. Finally, a sustainable food system must be responsive to the public needs and provide an adequate food supply to consumers in the entire economy.

### **Definition of food security; global, regional, domestic**

Most definitions of “food security” are equally general and can be confusing. The most general definition suggested by the USDA Economic Research Service is “Food security is access at all times to enough food for an active, healthy life”. This definition emphasizes

availability, access, utilization and stability. More specific interpretations of food security occur when considering the challenges in meeting the global demands for food, and the many implications of that challenge. Domestic food security is more clearly defined in terms of economics, and the ability of a population to consume more than 2100 calories per day per person. Although the implications of regional and global food security have an economics dimension, there are additional challenges as well.

### **Sustainability models**

Sustainability models attempt to quantify the impact of an activity by a variety of environmental and resource indicators. In many situations, the quantification includes “life cycle analysis”, or the assessment of raw material production, manufacture, distribution, use and disposal including all necessary intervening transportation steps. The typical currency for these analyses is the “carbon footprint” or the quantity of greenhouse gas emissions associated with the creation of a product. Most sustainability models account for use of land, water, and energy, soil loss, and climate change, as well as economic and social dimensions. A common unit for expressing these impacts is not evident. It is clear that many sectors of the food system are not prepared to provide adequate and accurate input data for current sustainability models. In addition, sustainability models, with a unified framework for gathering and sharing data and with uniform units to evaluate progress, need to be developed.

### **Potential limits on food production; energy, water, climate.**

As world populations increase, the demand for food and the challenges of food security increase. The needs to increase food production enhance the problems associated with availability of water and energy and the potential impacts of the food system on climate change. These challenges intensify the importance of research on the many sectors of the food system. The research challenges are more complex, and require a renewed focus on increased productivity, but with an equally important focus on efficiency. The food system must respond by finding ways to deliver more food to consumers, while reducing the demand on resources; but especially energy and water.

## **Reducing post-harvest losses; global and domestic**

One sector of the food system where changes can have direct impact on the efficient use of resources is post-harvest losses. Although these losses vary significantly from commodity to commodity, and from country to country, the estimates of losses from 5 to 30 % suggest many types of opportunities. Any reduction in the losses will have a two-fold impact, namely, an increased quantity of food available to the consumer and improved efficiency in the food system. Reductions in losses will also improve efficiency in energy and water utilization. Food product losses at any point in the food system not only results in the loss of the product, but also include the loss of water, energy and other resources associated with the production or processing of that product. The research needs for reductions in food losses are not complex, but the scale of processes used may need to be matched with scale of operations at a given location or in a specific country.

## **Unique domestic security challenges**

Domestic food security challenges are unique, and are closely related to local economies. Often, populations of low-income families become isolated from the typical channels of the food system, and access to the traditional food supply chain is limited. These domestic situations require special attention and become dependent on a range of philanthropic efforts, including support from various agencies within USDA. The results of these efforts have created an emphasis on a unique type of sustainable enterprise in local communities.

## **Meeting future demand for agricultural scientists and technicians**

The new challenges in sustainability and food security are evolving at a time when many of the human resources in the agricultural sciences are approaching the age of retirement. All estimates and demographics indicate that there will be a significant shortage of personnel including scientists for filling open positions within the USDA and related agencies over the next 5 to 10 years. It is evident that the current pipeline of these science professionals is not adequate unless new resources are identified and made available as soon as possible. The current shifts in funding of research through the Agriculture and Food Research Initiative (AFRI) may not be adequate in funding graduate students in the appropriate areas of study. Specific funding should

be directed to preparation of scientists in graduate programs emphasizing the latest methods and backgrounds required to address the unique challenges at the interface between sustainability and food security. These efforts will require coordination and cooperation among institutions of higher education, including minority serving and non-land grant colleges and universities, to ensure a diverse professional workforce in the future.

## **Summary**

Sustainability and food security are very important challenges for USDA research agencies, and these agencies should assume a leadership role in addressing these challenges. In order to ensure an effective and efficient assessment of the research needs, a uniform definition of sustainability as applied to the food system is needed, and the potential impacts on food security must be considered. Research on food security must recognize the unique differences between global and domestic food security. Successful and reliable sustainability models will require research to establish uniform units for quantification of the impacts of land use, soil loss, water use, energy use, and climate change. The validity and credibility of these models will depend on development of accurate and consistent input data, so development of methodologies for assembly of these data should be given priority. Although research on food production will remain a priority, emphasis on improved efficiency in use of energy and water is needed. Higher priority on research to reduce losses and wastes throughout the food system should be increased. The collaboration of USDA with the public and private sectors needs to be expanded to ensure the development of sustainable food enterprises for low income families. All of the research efforts described must be accomplished while placing greater emphasis on the education of a new generation of agricultural scientists and technicians.

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